

PRICE \$2.00

HEATH COMPANY • BENTON HARBOR, MICHIGAN

HEATHKIT® ASSEMBLY MANUAL



STEREO POWER AMPLIFIER
CRA-1000-1

Copyright © 1972
Heath Company
All rights reserved

595-1395

Dear Customer:

You have just purchased one of the best performing electronic products in the world — your Heathkit.

Here's how we aim to keep it that way:

Your Heathkit Warranty

During your first 90 days of ownership, any parts which we find are defective, either in materials or workmanship, will be replaced or repaired free of charge. And we'll pay shipping charges to get those parts to you — anywhere in the world.

If we determine a defective part has caused your Heathkit to need other repair, through no fault of yours, we will service it free — at the factory, at any retail Heathkit Electronic Center, or through any of our authorized overseas distributors.

This protection is exclusively yours as the original purchaser. Naturally, it doesn't cover damage by use of acid-core solder, incorrect assembly, misuse, fire, flood or acts of God. But, it does insure the performance of your Heathkit anywhere in the world — for most any other reason.

After-Warranty Service

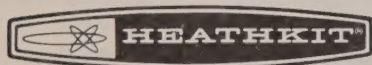
What happens after warranty? We won't let you down. If your Heathkit needs repairs or you need a part, just write or call the factory, your nearest retail Heathkit Electronic Center, or any Heath authorized overseas distributor. We maintain an inventory of replacement parts for each Heathkit model at most locations — even for models that no longer appear in our current product line-up. Repair service and technical consultation is available through all locations.

We hope you'll never need our repair or replacement services, but it's nice to know you're protected anyway — and that cheerful help is nearby.

Sincerely,

HEATH COMPANY
Benton Harbor, Michigan 49022

Assembly
and
Operation
of the



STEREO POWER
AMPLIFIER

MODEL CRA-1000-1



TABLE OF CONTENTS

Introduction	2
Parts List	2
Step-by-Step Assembly	4
Chassis Assembly and Wiring	9
Specifications	16
Circuit Description	16
Circuit Board X-Ray Views	17
Voltage Chart	18
Schematic. . . (fold-out from page)	19

INTRODUCTION

The Heathkit Stereo Power Amplifier Model CRA-1000-1 is a high fidelity, dual channel power amplifier designed as a plug-in module for the Model CT-1001 Stereo Cassette Player or the Model CR-1000 FM Stereo Tuner. A short cable is included which enables this Power Amplifier to be used with both the Cassette Player and the FM Tuner.

Rugged construction and dependable solid-state circuitry delivers over 3.5 watts per channel to give you sound entertainment at its best.

The Amplifier is designed to mount to the rear of either the Stereo Cassette Player or the FM Stereo Tuner. The Amplifier matches the styling of either unit and results in a small, attractive package.

Refer to the "Kit Builders Guide" for complete information on unpacking, parts identification, tools, wiring, soldering, and step-by-step assembly procedures.

PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers on the Parts Pictorial (fold-out from Page 3). Any part that is packed in an envelope should be returned to the envelope after it has been identified.

To order replacement parts, use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to the "Replacement Parts" section in the "Kit Builders Guide."

KEY PART No.	PARTS No.	Per Kit	DESCRIPTION	PRICE Each
RESISTORS				
A1	1-49	4	22 Ω (red-red-black)	.10
A1	1-1	2	47 Ω (yellow-violet-black)	.10
A1	1-3	6	100 Ω (brown-black-brown)	.10
A1	1-56	2	240 Ω , 5% (red-yellow-brown-gold)	.10
A1	1-4	2	330 Ω (orange-orange-brown)	.10
A1	1-9	2	1000 Ω (brown-black-red)	.10
A1	1-19	2	6800 Ω (blue-gray-red)	.10
A1	1-20	4	10 k Ω (brown-black-orange)	.10
A1	1-124	2	27 k Ω (red-violet-orange-gold)	.10

CAPACITORS

A2	21-145	5	.001 μ F feedthrough	.15
A3	21-143	2	.05 μ F disc	.10
A4	25-250	1	50 μ F electrolytic	.30
A4	25-56	4	100 μ F electrolytic	.40
A4	25-230	2	2000 μ F electrolytic	1.90
A5	27-47	2	.1 μ F Mylar*	.20

*DuPont registered trademark

KEY PART No.	PARTS No.	Per Kit	DESCRIPTION	PRICE Each
GASKET-GROMMET-INSULATORS				
B1	73-77	1	Foam gasket	.10
B2	73-52	1	Plastic grommet	.10
B3	75-24	1	Strain relief	.10
B4	75-152	4	Plastic insulator (packed between cardboard)	.10
B5	75-174	1	Insulating paper	.15

DIODES-TRANSISTORS

NOTE: Transistors are marked for identification in one of the following four ways:

1. Part number.
2. Transistor type number.
3. Part number and type number.
4. Part number with a type number other than the one listed.

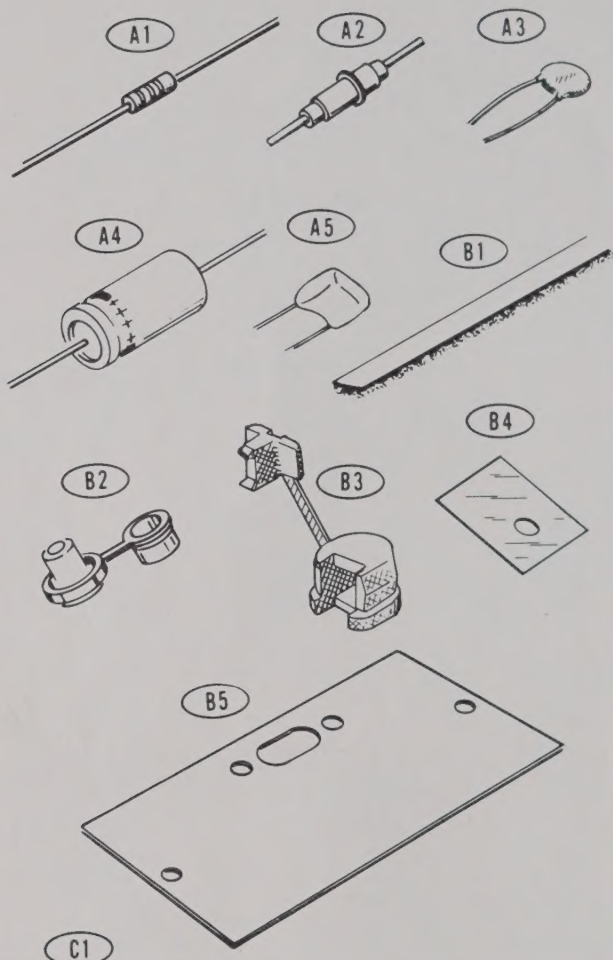
C1	56-73	2	MZ2360 diode	.35
C1	56-74	2	MZ2362 diode	.65
C2	417-91	4	2N5232A transistor	.85
C2	417-94	2	2N3416 transistor	1.00
C2	417-201	4	X29A829 transistor	.50
C3	417-175	4	2N5294 transistor	1.45

KEY PART		PARTS	DESCRIPTION	PRICE	KEY PART		PARTS	DESCRIPTION	PRICE
No.	No.	Per Kit		Each	No.	No.	Per Kit		Each
WIRE-CABLES					FUSEHOLDER-CONNECTORS-SOCKET-PLUG-CAP				
	344-90	1	Small black wire	.05/ft	F4	423-10	1	Fuseholder	.50
	344-92	1	Small red wire	.05/ft	F5	431-8	1	3-screw terminal strip	.10
	344-94	1	Small yellow wire	.05/ft	F6	432-17	1	4-lug socket	.10
	344-96	1	Small blue wire	.05/ft	F7	434-174	1	Phono socket assembly	.15
	344-15	1	Large black wire	.05/ft	F8	432-18	3	4-pin plug	.10
	134-202	2	Shielded cable with plugs	.60	F9	438-4	2	Phono plug	.10
	347-9	1	3-wire shielded cable	.10/ft	F10	440-3	2	Plug cap with insulator	.10
HARDWARE					METAL PARTS				
#4 Hardware					G1	204-1291	2	Heat sink	.40
D1	250-366	4	4-40 x 3/16" screw	.05	G2	204-1292	2	Shield	.50
D2	250-52	4	4-40 x 1/4" screw	.05	G3	204-1293-1	1	Floor mounting bracket	.55
D3	250-213	6	4-40 x 5/16" screw	.05	G4	205-864-1	2	Interconnector bracket	.20
D4	252-15	14	4-40 nut	.05	G5	214-149-1	1	Chassis	.90
D5	254-9	15	#4 lockwasher	.05	MISCELLANEOUS				
#6 Hardware						85-1113-2	1	Circuit board	1.25
E1	250-56	4	6-32 x 1/4" screw	.05	H1	352-13	1	Silicone grease	.15
E2	250-89	2	6-32 x 3/8" screw	.05	H2	354-6	2	Cable tie	.10
E3	250-276	4	6-32 x 3/8" black flat head screw	.05		391-34	1	Blue and white label	
E4	250-168	2	6-32 x 1-3/8" screw	.05	H3	421-2	1	3AG fuse	.10
E5	251-1	4	6-32 spade bolt	.05	H4	490-5	1	Nut starter	.10
E6	252-3	8	6-32 nut	.05	H5	490-41	1	1/8" allen wrench	.10
E7	253-2	4	Fiber shoulder washer	.05		597-308	1	Kit Builders Guide	
E8	253-34	2	Fiber flat washer	.05		597-260	1	Parts Order Form	
E9	253-60	4	Flat washer	.05			1	Installation Manual (See front cover for part number.)	2.00
E10	254-1	9	#6 lockwasher	.05			1	Assembly Manual (See front cover for part number.)	
E11	254-8	4	Split ring lockwasher	.05				Solder (Additional 3' rolls of solder, #331-6, can be ordered for 15 cents each.)	
E12	259-6	2	#6 solder lug	.05					
Other Hardware									
F1	250-261	3	#10 x 1-1/2" screw	.05					
F2	259-15	2	Connector lug	.05					
F3	259-24	2	#8 solder lug	.05					

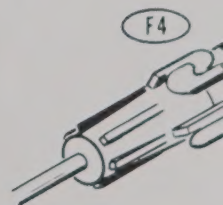
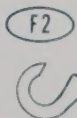
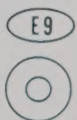
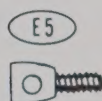
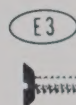
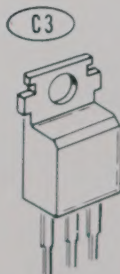
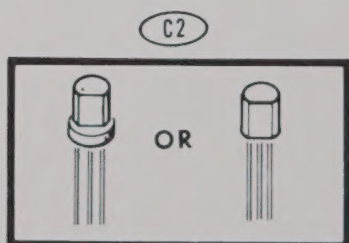
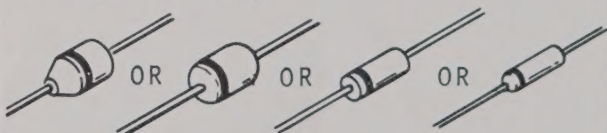
The above prices apply only on purchases from the Heath Company where shipment is to a U.S.A. destination. Add 10% (minimum 25 cents) to the price when ordering from a Heathkit Electronic Center to cover local sales tax, postage,

and handling. Outside the U.S.A. parts and service are available from your local Heathkit source and will reflect additional transportation, taxes, duties, and rates of exchange.

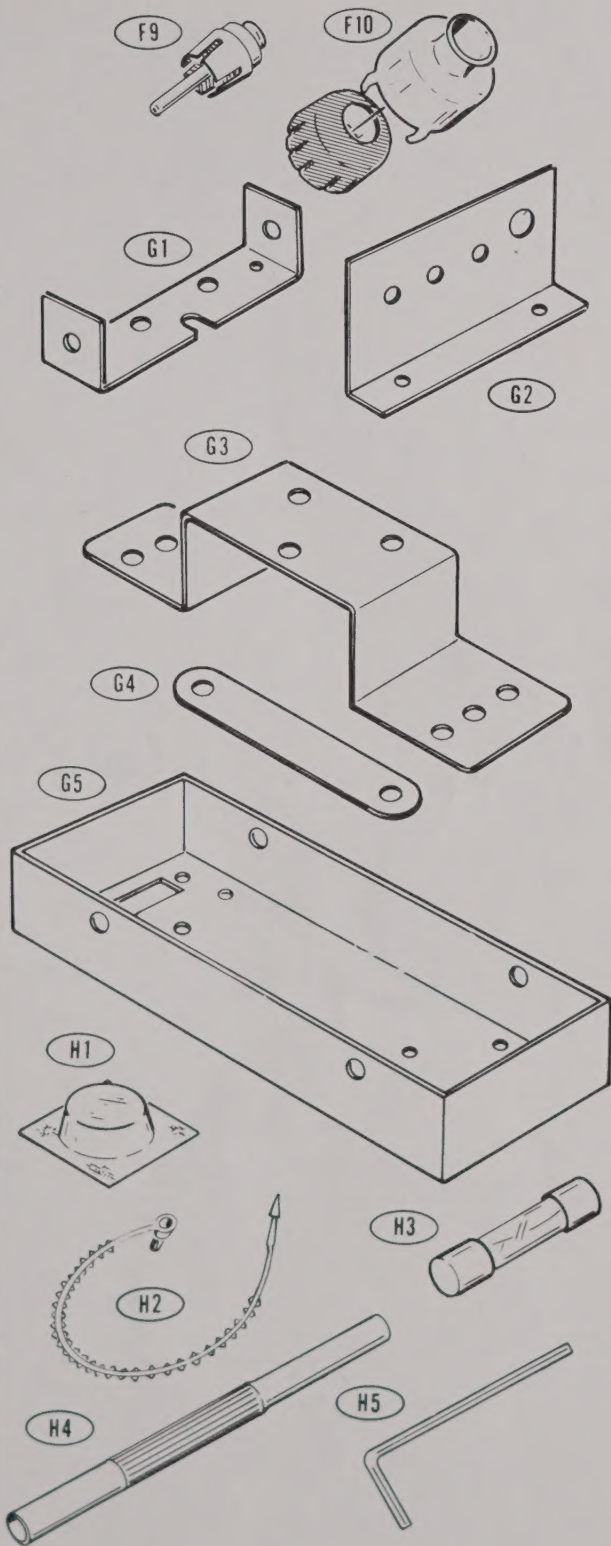
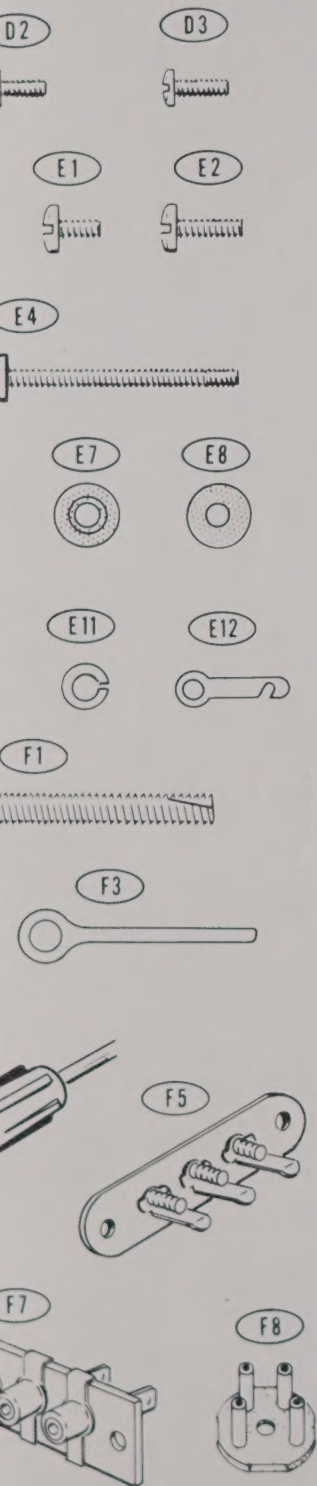
PARTS



NOTE: HEATH PART NUMBERS ARE STAMPED ON MOST DIODES.



PICTORIAL



STEP-BY-STEP ASSEMBLY

Before you start to assemble this kit, read the Kit Builders Guide for complete information on wiring, soldering, and step-by-step procedures.

Resistors will be called out by their resistance value (in Ω or $k\Omega$) and color code. Use 1/2-watt, 10% resistors unless directed otherwise in a step.

Capacitors will be called out by their capacitance value (in pF or μF) and type (disc, Mylar, or electrolytic).

CIRCUIT BOARD ASSEMBLY

Proceed to Pictorial 1-1 and complete the following steps.

START



FOR GOOD SOLDERED CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN...
WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.



(✓) Position the circuit board as shown, with the slot on the right.

(✓) 100 Ω (brown-black-brown).

(✓) 100 Ω (brown-black-brown).

(✓) 22 Ω (red-red-black).

(✓) 10 $k\Omega$ (brown-black-orange).

(✓) 47 Ω (yellow-violet-black).

(✓) 6800 Ω (blue-gray-red).

(✓) 10 $k\Omega$ (brown-black-orange).

(✓) 240 Ω , 5% (red-yellow-brown-gold).

(✓) Solder the leads to the foil and cut off the excess lead lengths.

(✓) 6800 Ω (blue-gray-red).

(✓) 47 Ω (yellow-violet-black).

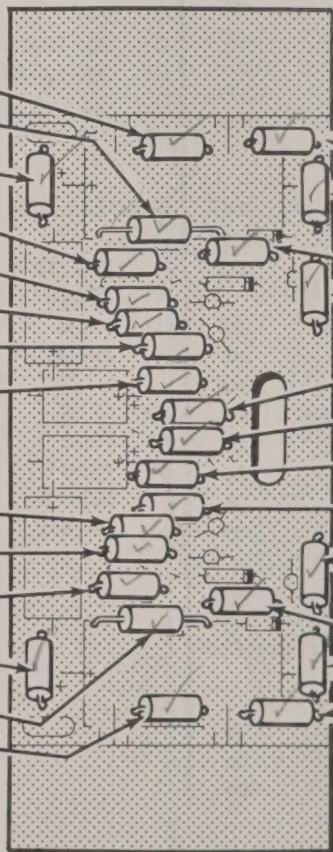
(✓) 10 $k\Omega$ (brown-black-orange).

(✓) 22 Ω (red-red-black).

(✓) 100 Ω (brown-black-brown).

(✓) 100 Ω (brown-black-brown).

(✓) Solder the leads to the foil and cut off the excess lead lengths.



CONTINUE



(✓) 100 Ω (brown-black-brown).

(✓) 1000 Ω (brown-black-red).

(✓) 22 Ω (red-red-black).

(✓) 330 Ω (orange-orange-brown).

(✓) 27 $k\Omega$, 5% (red-violet-orange-gold).

(✓) 27 $k\Omega$, 5% (red-violet-orange-gold).

(✓) 240 Ω , 5% (red-yellow-brown-gold).

(✓) 10 $k\Omega$ (brown-black-orange).

(✓) 330 Ω (orange-orange-brown).

(✓) 22 Ω (red-red-black).

(✓) 1000 Ω (brown-black-red).

(✓) 100 Ω (brown-black-brown).

(✓) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 1-1

START



NOTE: When you install capacitors on this circuit board, remove the excess coating from the leads. Use long-nose pliers to remove this coating.



REMOVE COATING
EVEN WITH BOTTOM
OF CAPACITOR BODY

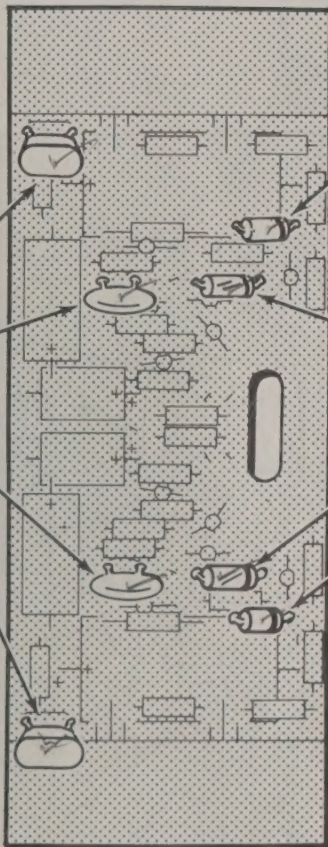
(✓) .1 μ F Mylar.

(✓) .05 μ F disc.

(✓) .05 μ F disc.

(✓) .1 μ F Mylar.

(✓) Solder the leads to the foil and cut off the excess lead lengths.



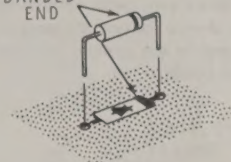
NOTE: DIODES MAY BE SUPPLIED IN ANY OF THE FOLLOWING SHAPES. ALWAYS POSITION THE BANDED END AS SHOWN ON THE CIRCUIT BOARD.



BAND OR BANDS

(✓) Diode (#56-73).

BANDED
END



(✓) Diode (#56-74). NOTE: Do not mistake the copper colored wire in the diode for the band.

(✓) Diode (#56-74). NOTE: Do not mistake the copper colored wire in the diode for the band.

(✓) Diode (#56-73).

(✓) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 1-2

CONTINUE

START

NOTE: When you install electrolytic capacitors, always position the positive (+) marked end to the positive (+) mark on the circuit board.

POSITIVE
(+) MARK



Be sure you install the next four capacitors in the order designated. Solder the leads of each capacitor as it is installed.

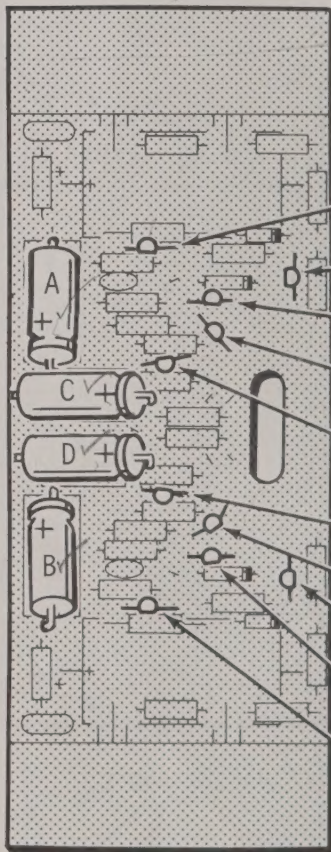
() 100 μ F electrolytic at A.

(✓) 100 μ F electrolytic at B.

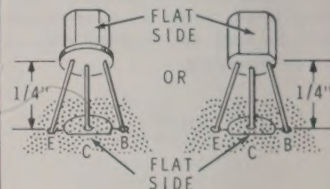
() 100 μ F electrolytic at C.

() 100 μ F electrolytic at D.

(✓) Cut off the excess lead lengths.



NOTE: When you install transistors, line up the flat of the transistor with the outline of the flat on the circuit board. Then insert the leads into the circuit board and solder them to the foil. Cut off the excess lead lengths.



(✓) 2N3416 transistor (#417-94) at Q4L.

(✓) X29A829 transistor (#417-201) at Q6L.

(✓) X29A829 transistor (#417-201) at Q3L.

(✓) 2N5232A transistor (#417-91) at Q1L.

(✓) 2N5232A transistor (#417-91) at Q2L.

(✓) 2N5232A transistor (#417-91) at Q2R.

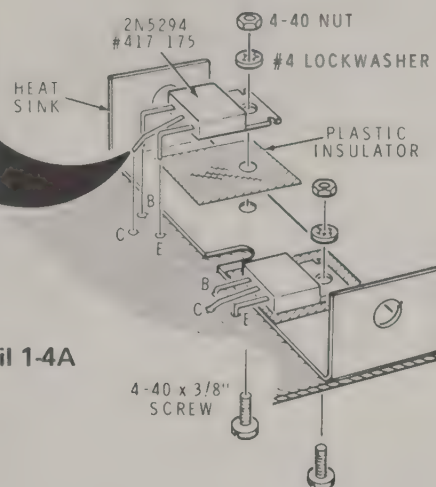
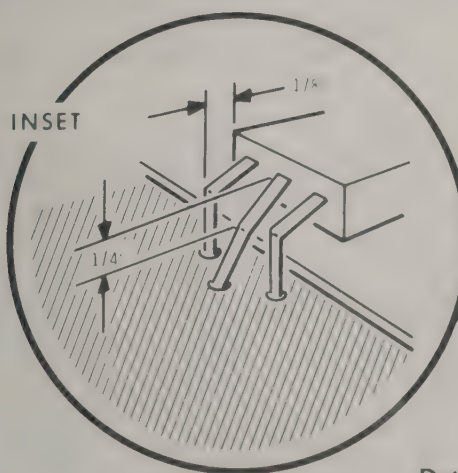
(✓) 2N5232A transistor (#417-91) at Q1R.

(✓) X29A829 transistor (#417-201) at Q6R.

(✓) X29A829 transistor (#417-201) at Q3R.

(✓) 2N3416 transistor (#417-94) at Q4R.

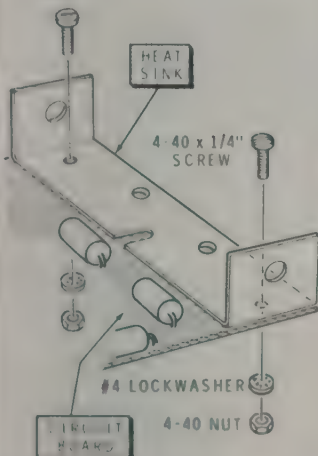
PICTORIAL 1-3



Detail 1-4A

START

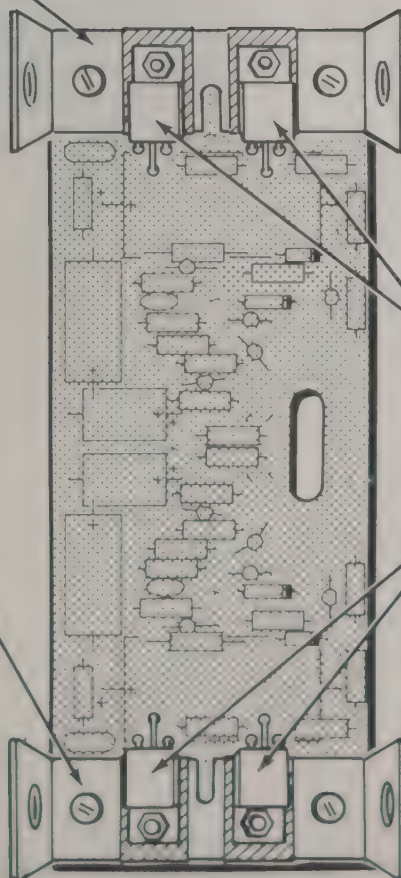
- () Mount a heat sink to the circuit board with two 4-40 x 1/4" screws, two #4 lockwashers, and two 4-40 nuts.



- () In the same manner, mount the other heat sink to the circuit board. Use two 4-40 x 1/4" screws, two #4 lockwashers, and two 4-40 nuts.

- () Locate the plastic insulators (packed between cardboard) and the cup of silicone grease.

- () Cut the grease cup as shown.



PICTORIAL 14

CONTINUE

NOTE: In the following steps, apply a liberal amount of silicone grease to both sides of each plastic insulator before it is installed.

- () Refer to Detail 1-4A and mount two 2N5294 transistors (#417-175) on the heat sink. Bend the transistor leads so they go into their correct holes (see the inset drawing). Use two 4-40 x 3/8" screws, two #4 lockwashers, and two 4-40 nuts.

- () In the same manner, mount the other two 2N5294 transistors (#417-175) on the heat sink. Bend the transistor leads so they go in their correct holes. Use two 4-40 x 3/8" screws, two #4 lockwashers, and two 4-40 nuts.

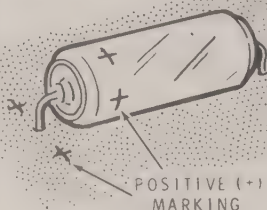
- () Solder the transistor leads to the foil and cut off the excess lead lengths.

START



NOTE: Due to other parts on the circuit board, the next two capacitors will not sit against the circuit board.

- () 2000 μ F electrolytic. Be sure to position the positive (+) marked end as shown.



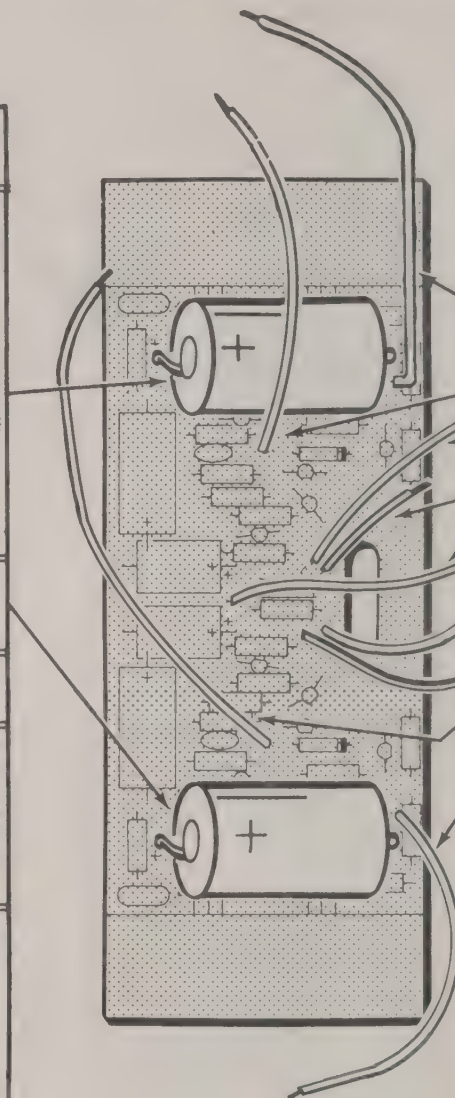
- () 2000 μ F electrolytic. Be sure to position the positive (+) marked end as indicated.

- () Solder the leads to the foil and cut off the excess lead lengths.

NOTE: When you are instructed to prepare a wire, cut the wire to the length specified and remove 1/4" of insulation from each end. Then twist the fine wire strands at each end of the wire and apply a small amount of solder to hold the strands together.

- () Prepare the following lengths of small wire.

8-1/2" blue	2" black
4" red	1" yellow
2" black	2" black
1" blue	6-1/2" red
	2-1/2" yellow



CONTINUE



In the following steps one end of each wire will be connected to the circuit board. The location of each wire is called out by its color on the circuit board. Solder the wires as they are installed.

- (✓) 8-1/2" blue wire.

- (✓) 4" red wire.

- (✓) 2" black wire.

- (✓) 1" blue wire.

- (✓) 2" black wire.

- (✓) 1" yellow wire.

- (✓) 2" black wire.

- () 6-1/2" red wire.

- (✓) 2-1/2" yellow wire.

- () Cut off any excess lead lengths on the foil side of the circuit board.

- (✓) Check the foil side of the circuit board to make sure all of the holes are soldered.

- (✓) Reheat any solder connections that look as if they may not be properly soldered.

Set the circuit board aside temporarily.

FINISH

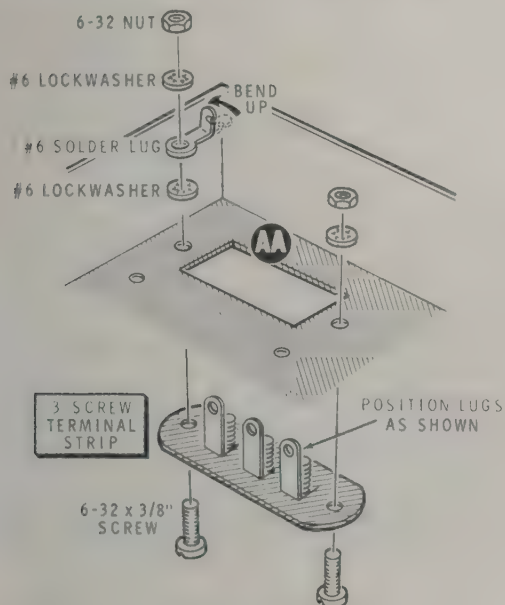
PICTORIAL 1-5



CHASSIS ASSEMBLY AND WIRING

Refer to Pictorial 2-1 (fold-out from Page 11) for the following steps.

- () Locate a 3-screw terminal strip, two 6-32 x 3/8" screws, three #6 lockwashers, one #6 solder lug, and two 6-32 nuts. Use these parts in the next step.

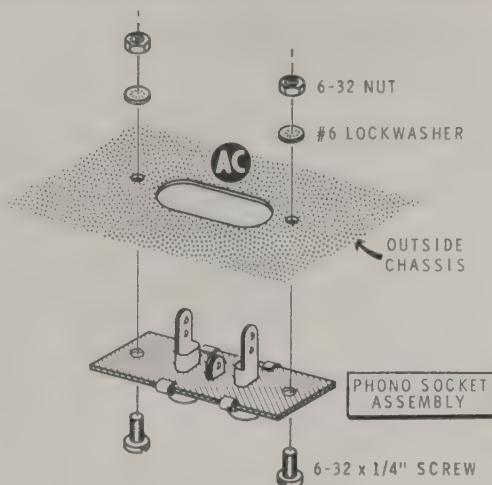


Detail 2-1A

- () Refer to Detail 2-1A and mount the 3-screw terminal strip outside of the chassis at AA. Be sure to place a lockwasher on each side of the #6 solder lug. Bend the solder lug as shown before you install it.

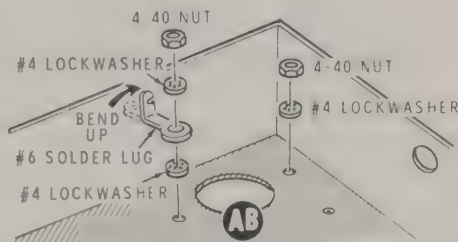
- () Refer to Detail 2-1B and mount the phono socket assembly outside the chassis at AC. Use two 6-32 x 1/4" screws, two #6 lockwashers, and two 6-32 nuts.

- () Locate a 4-lug socket, two 4-40 x 3/8" screws, three #4 lockwashers, a #6 solder lug, and two 4-40 nuts. Use these parts in the next step.



Detail 2-1B

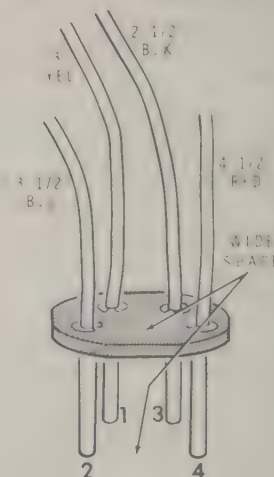
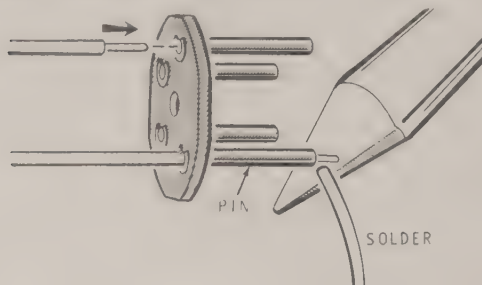
- () Refer to Detail 2-1C and mount the 4-lug socket outside the chassis at AB. Note the wide space between two of the lugs. Place a lockwasher on both sides of the #6 solder lug and bend the solder lug as shown.



Detail 2-1C

APPLY HEAT TO THE TIP OF THE PIN
ONLY LONG ENOUGH FOR THE SOLDER TO
BE DRAWN UP INTO THE PIN BY CAPILLARY
ACTION.

CUT OFF THE EXCESS WIRE FROM THE TIP OF THE PIN.



Detail 2-2A

- () Prepare the following lengths of small wire:

2" black
1-1/2" yellow
1-1/2" blue

NOTE: Refer to the "Soldering" section in the Kit Builders Guide for information on soldering instructions (NS), (S-1) etc.

- () Connect a 2" small black wire from lug 2 of AA (S-1) to the solder lug (S-1).
- () Connect one end of a 1-1/2" small yellow wire to lug 1 of AA (S-1). The other end will be connected later.
- () Connect one end of a 1-1/2" small blue wire to lug 3 of AA (S-1). The other end will be connected later.

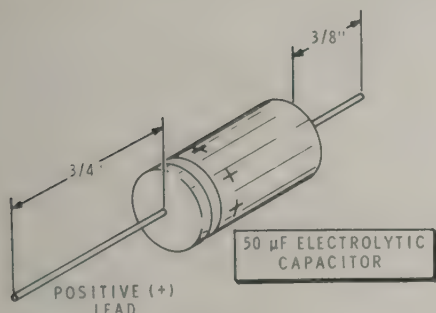
Refer to Pictorial 2-2 for the following steps.

- () Prepare the following lengths of small wire:

1-1/2" yellow
1-1/2" red
1-1/2" red
4-1/2" red
2-1/2" black
3-1/2" blue
3" yellow

NOTE: When you solder a wire to the 4-lug socket, be careful that solder does not flow down into the socket. If this should happen, hold the socket upside down and heat the lug until the solder flows out.

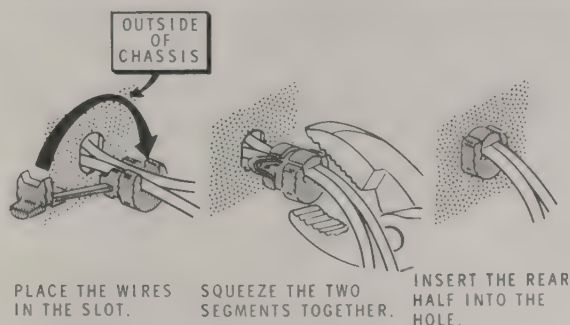
- () Connect one end of a 1-1/2" small yellow wire to lug 1 of socket AB (S-1).
- () Connect one end of a 1-1/2" small red wire to lug 2 of socket AB (S-1).
- () Connect one end of a 1-1/2" small red wire to lug 4 of socket AB (NS).
- () Refer to Detail 2-2A and prepare a 4-pin plug. Use the lengths of wire that were previously prepared.
- () Connect the black wire coming from the 4-pin plug to lug 3 of socket AB (NS). The other wires coming from this plug will be connected later.
- () Locate the large black wire and remove 3/4" of insulation from one end. Twist together the fine wire strands but do not apply solder.
- () Pass this end of the large black wire through hole AD from outside the chassis.
- () Refer to the inset drawing on Pictorial 2-2 and connect the bare end of the large black wire to the solder lug and to lug 3 of socket AB. Solder the solder lug but not lug 3 of the socket.
- () Locate a 50 μ F electrolytic capacitor. Cut the positive (+) marked end to 3/4" and the negative (unmarked) lead to 3/8". (See Detail 2-2B.)
- () Connect the negative (unmarked) lead of this capacitor to lug 3 of socket AB (S-3). The other lead will be connected later.



Detail 2-2B

Refer to Detail 2-2C for the following steps.

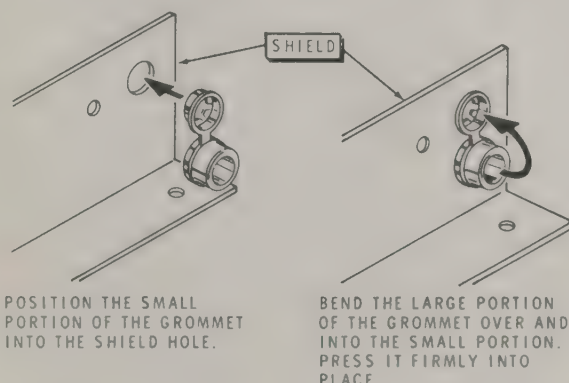
- () Cut the fuseholder wire 6" from one end of the fuseholder.
- () Open the fuseholder by twisting the two halves counterclockwise to each other.
- () Remove the 6" wire from the fuseholder and remove both springs from the fuseholder wire. (There may be only one spring.)
- () Place the shorter of the two springs (if there are two) over the 6" fuseholder wire. Then replace this wire in the fuseholder half.
- () Insert the fuse in the fuseholder and twist the fuseholder halves together again.
- () Discard the long coil spring. It will not be used.
- () Remove 1/4" of insulation from each fuseholder wire. Then twist the fine wire strands but do not apply solder.
- () Insert the long fuseholder wire through hole AD and connect it to lug 4 of socket AB (S-2).
- () Refer to Detail 2-2D and install the strain relief in hole AD from outside the chassis.
- () Check the connections on socket AB. Cut off any excess wire ends that may touch another lug.



Detail 2-2D

Refer to Pictorial 2-3 for the following steps.

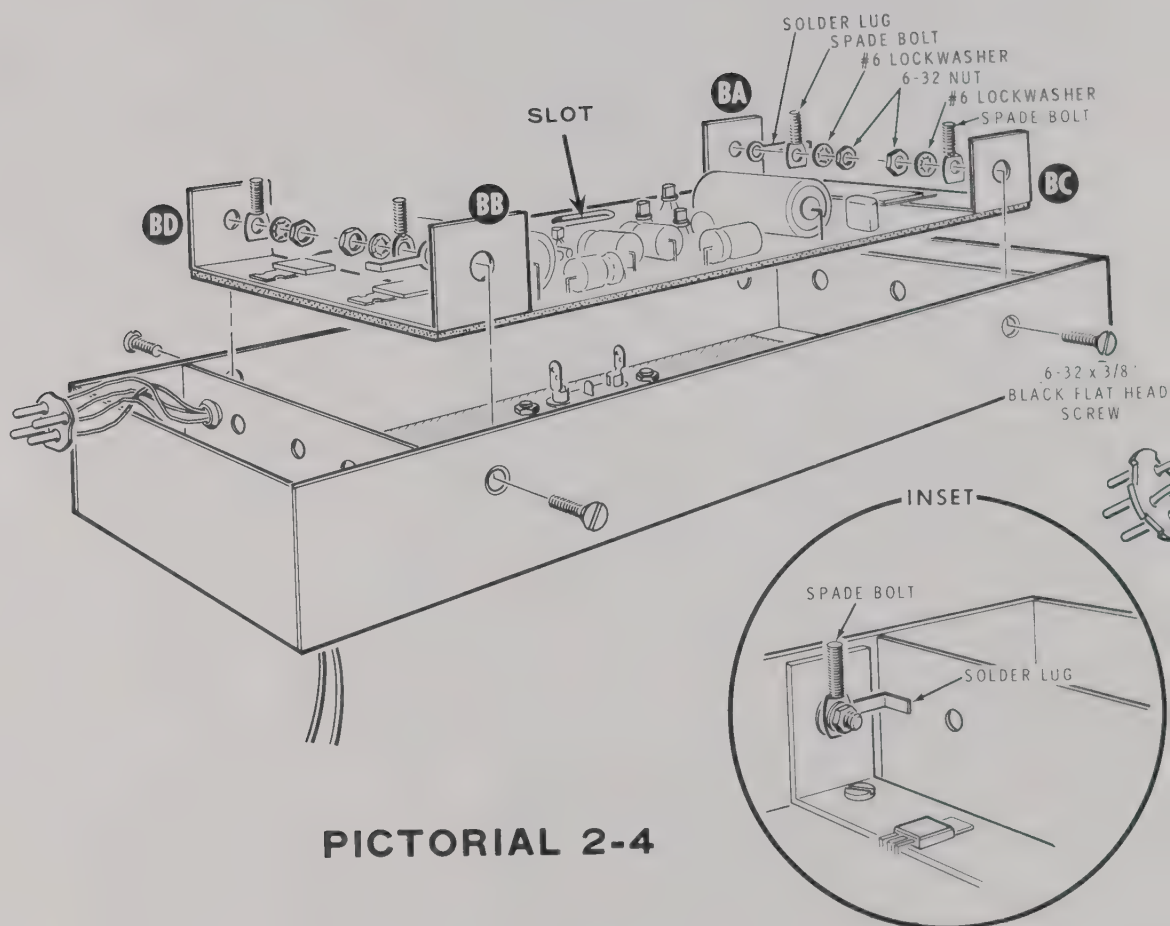
- () Peel the protective paper backing from the insulating paper. Then press the paper into place in the bottom of the chassis.
- () Install a shield in the chassis at AE. Use two 4-40 x 3/16" screws, two #4 lockwashers, and two 4-40 nuts.



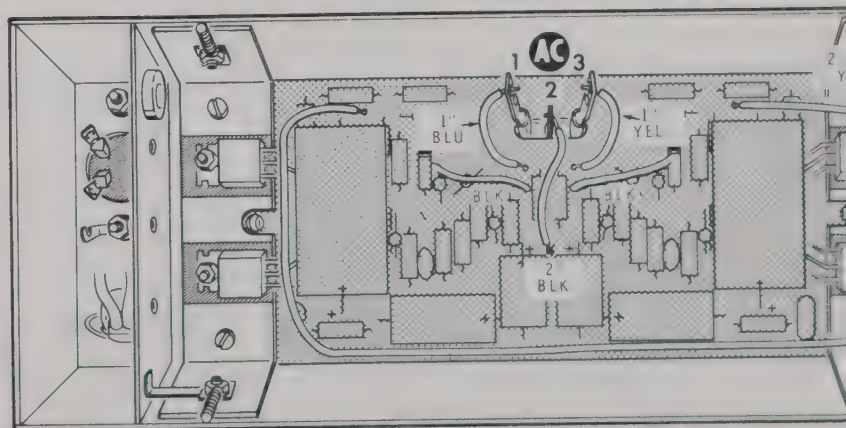
Detail 2-3A

- () Refer to Detail 2-3A and install a plastic grommet in the large hole of the other shield.
- () Pass the red, blue, and yellow wires from the 4-pin plug through the plastic grommet. Then mount the shield at AF with two 4-40 x 3/16" screws, two #4 lockwashers, and two 4-40 nuts.

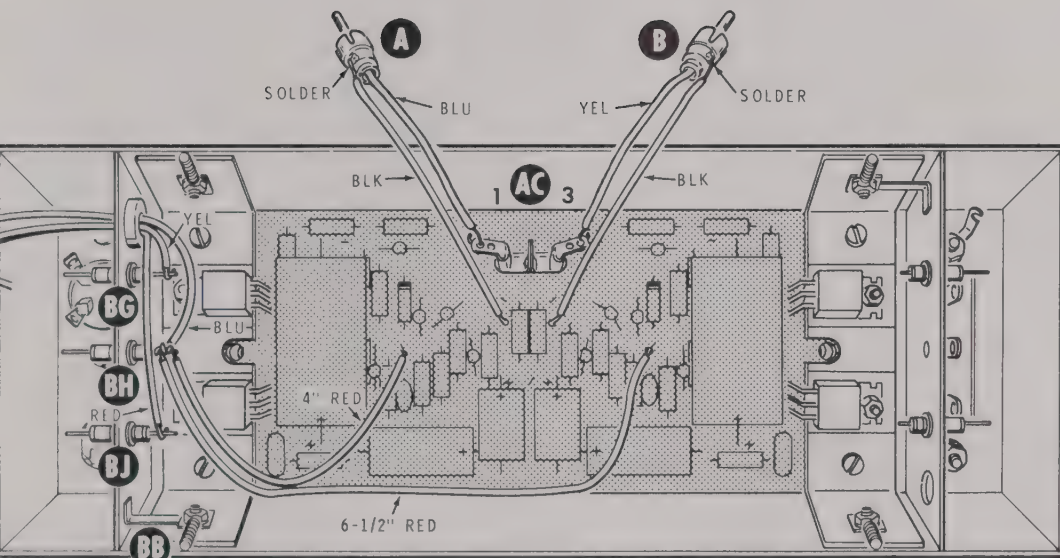




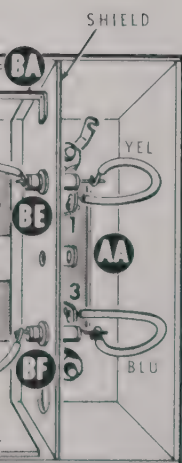
PICTORIAL 2-4

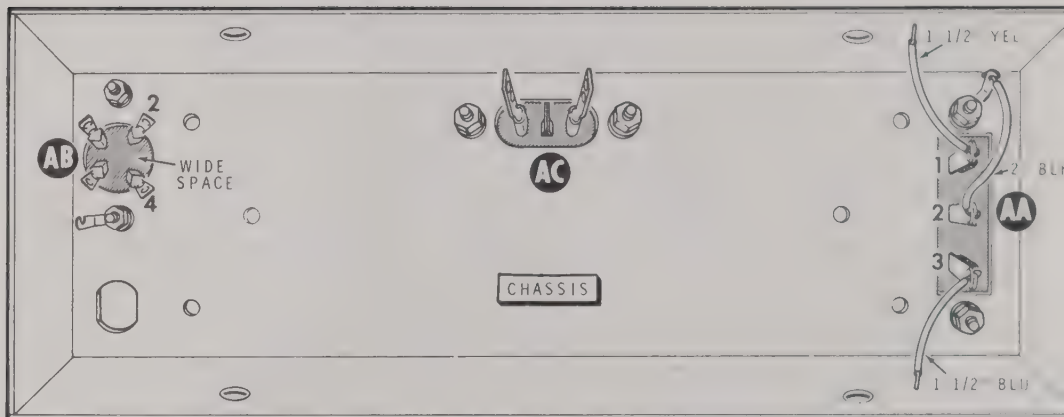


PICTORIAL 2-5

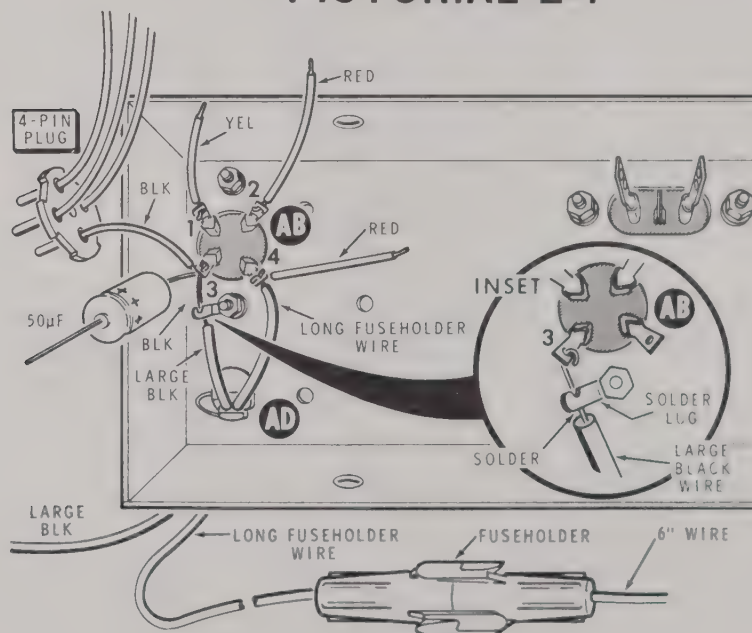


PICTORIAL 2-6

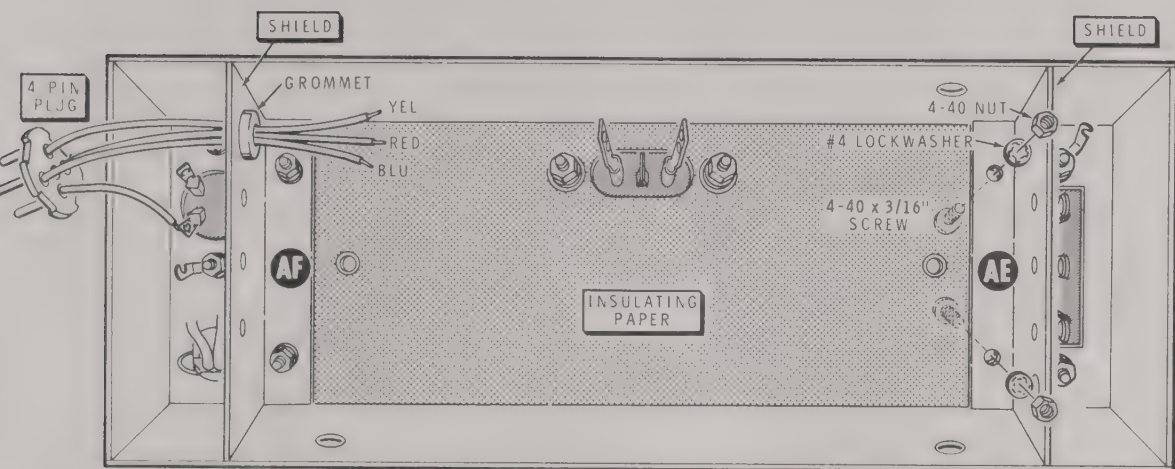




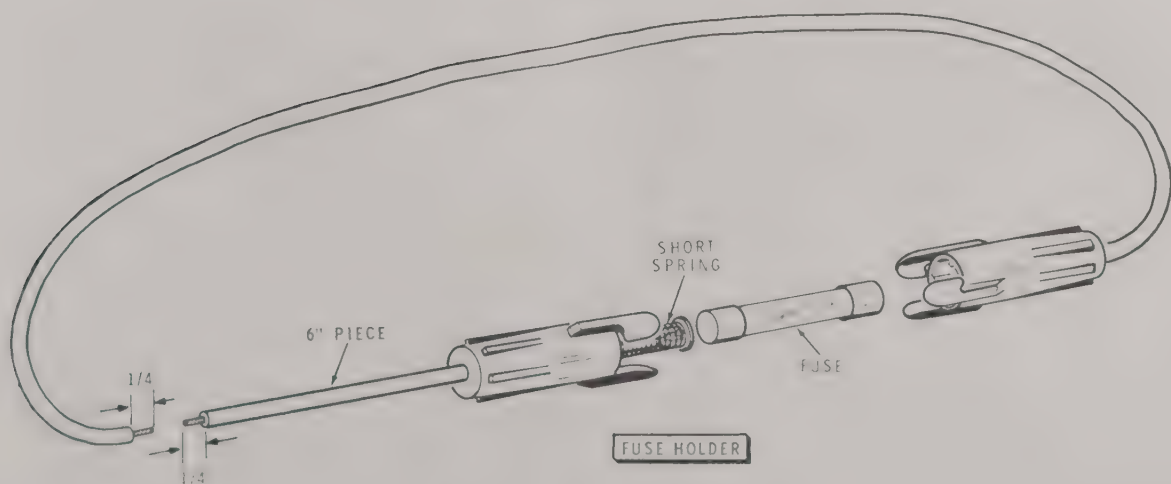
PICTORIAL 2-1



PICTORIAL 2-2



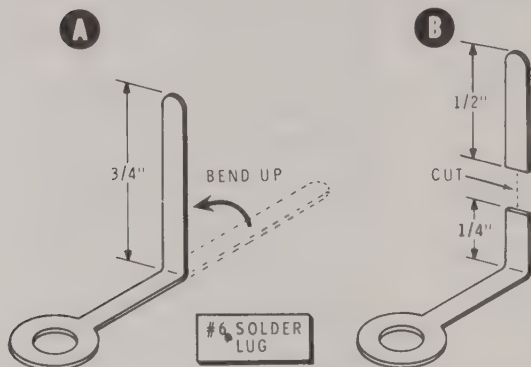
PICTORIAL 2-3



Detail 2-2C

Refer to Pictorial 2-4 for the following steps.

- () Slide the circuit board down into the chassis. Be sure to position the wires from the plastic grommet on top of the circuit board. Also be sure the slot in the circuit board is positioned over the phono socket assembly.



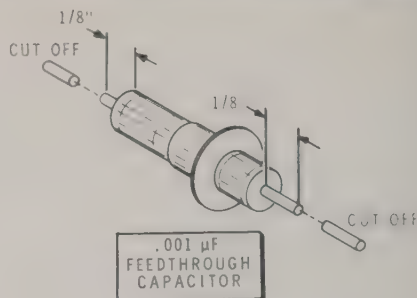
Detail 2-4A

- () Refer to Detail 2-4A and prepare two #8 solder lugs as follows:

1. First, bend 3/4" of the end of each lug at a right angle.
2. Next, cut 1/2" off the end of each lug. Use these lugs in the following steps.

NOTE: In the following steps, position the spade bolts so that the flat part is flush against the heat sink.

- () Secure the heat sink to the chassis at BA with a 6-32 x 3/8" black flat head screw, a solder lug, a 6-32 spade bolt, a #6 lockwasher, and a 6-32 nut. Do not tighten the hardware.
- () Refer to the inset drawing on Pictorial 2-4 and position the spade bolt and solder lug as shown. Then tighten the screw.
- () In the same manner, secure the heat sink to the opposite corner of the chassis at BB. Use a 6-32 x 3/8" black flat head screw, a solder lug, a 6-32 spade bolt, a #6 lockwasher, and a 6-32 nut. Position the spade bolt and solder lug as shown in the inset drawing and tighten the hardware.
- () Secure the heat sink to the chassis at BC and BD. Use a 6-32 x 3/8" black flat head screw, a 6-32 spade bolt, a #6 lockwasher, and a 6-32 nut at each location. Position the spade bolts as before.

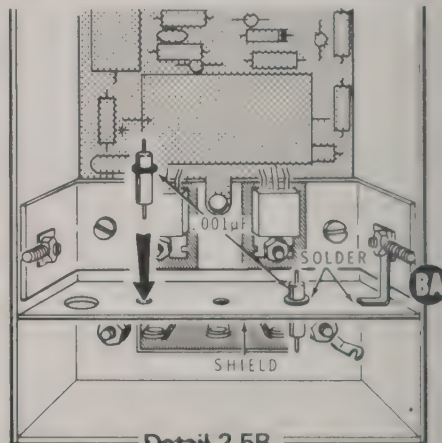


Detail 2-5A

Refer to Pictorial 2-5 for the following steps.

- () Refer to Detail 2-5A and cut the pins of all five feedthrough capacitors to 1/8". Use two of these capacitors in the next step.

NOTE: The metal flange on the feedthrough capacitors will be soldered to the shield in the next step. Heat the shield enough to allow solder to flow around the flange.



Detail 2-5B

- () Refer to Detail 2-5B and set the chassis on its right end. Then solder two .001 μ F feedthrough capacitors into the shield.
- () Solder the solder lug at BA to the shield as shown.
- () Lay the chassis down as shown in Pictorial 2-5.

NOTE: In the following steps, you can easily connect wires to the feedthrough capacitors if you form a small loop in the end of the wire first. Then slip the loop over the pin extending from the capacitor and solder the wire to the capacitor.

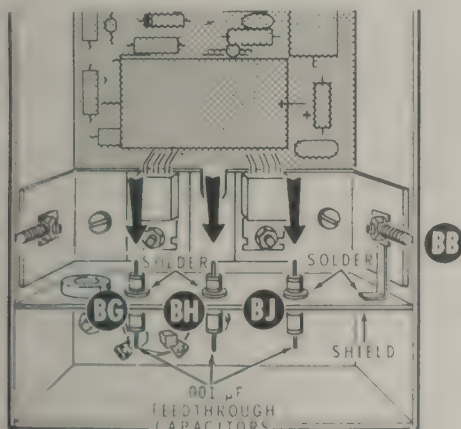
- () Connect the free end of the yellow wire coming from lug 1 of AA to feedthrough capacitor BE (S-1).
- () Connect the free end of the blue wire coming from lug 3 of AA to feedthrough capacitor BF (S-1).

Connect the wires coming from the circuit board as follows:

- () 2-1/2" yellow wire to feedthrough capacitor BE (S-1).
- () 8-1/2" blue wire to feedthrough capacitor BF (S-1). Route this wire around the large capacitor as shown.
- () 1" yellow wire to lug 3 of phono socket AC (NS).
- () 2" black wire to lug 2 of phono socket AC (S-1).
- () 1" blue wire to lug 1 of phono socket AC (NS).

Refer to Pictorial 2-6 for the following steps.

- () Set the chassis on its left end.



Detail 2-6A

- () Refer to Detail 2-6A and solder three .001 μF feedthrough capacitors in the shield. NOTE: Be careful that you do not melt the plastic grommet.
- () Solder the solder lug at BB to the shield as shown in Detail 2-6A.
- () Lay the chassis down as shown in Pictorial 2-6.

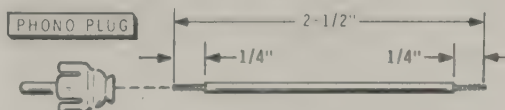
Connect the wires coming from the plastic grommet as follows:

- () Yellow wire to feedthrough capacitor BG (S-1).

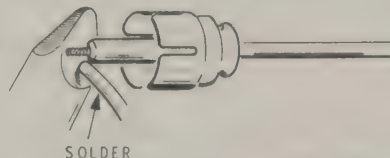
- () Blue wire to feedthrough capacitor BH (NS).
- () Red wire to feedthrough capacitor BJ (S-1).

Connect the wires coming from the circuit board as follows:

- () 6-1/2" red wire to feedthrough capacitor BH (NS). Route this wire along the side of the chassis as shown.
- () 4" red wire to feedthrough capacitor BH (S-3). Route this wire around the large capacitor.



INSERT THE WIRE THROUGH THE PLUG

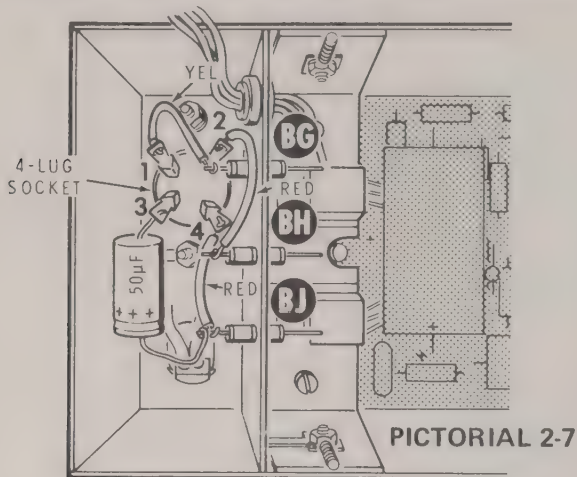


APPLY HEAT TO THE TIP OF THE PIN ONLY LONG ENOUGH FOR THE SOLDER TO BE DRAWN UP INTO THE PIN BY CAPILLARY ACTION.

CUT OFF EXCESS WIRE FROM THE TIP OF THE PIN.

Detail 2-6B

- () Refer to Detail 2-6B and prepare two phono plugs. Use a 2-1/2" blue wire in one plug and a 2-1/2" yellow wire in the other plug.
- () Connect the blue phono plug wire to lug 1 of phono socket AC (NS).
- () Connect the yellow phono plug wire to lug 3 of phono socket AC (NS).
- () Bend lugs 1 and 3 of phono socket assembly AC over against the circuit board as shown.
- () Solder the connections on lugs 1 and 3 of phono socket assembly AC.
- () Solder the bare end of the indicated black wire coming from the circuit board to the outer case of phono plug A.
- () In the same manner, solder the other black wire coming from the circuit board to the outer case of phono plug B.

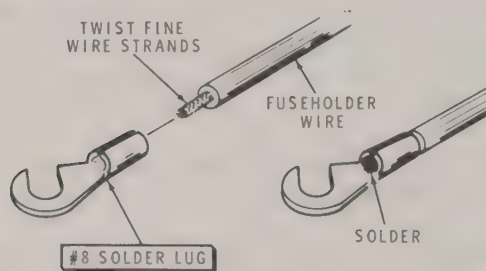


PICTORIAL 2-7

Refer to Pictorial 2-7 for the following steps.

Connect the wires coming from the 4-lug socket as follows:

- () Yellow wire from lug 1 to feedthrough capacitor BG (S-1).
- () Red wire from lug 2 to feedthrough capacitor BH (S-1). Be sure you do not use the red wire from lug 4 by mistake.
- () Red wire from lug 4 to feedthrough capacitor BJ (NS).
- () Connect the positive (+) lead of the 50 μ F electrolytic capacitor to feedthrough capacitor BJ (S-2). Be sure the body of the electrolytic capacitor is not touching the feedthrough capacitor pin.



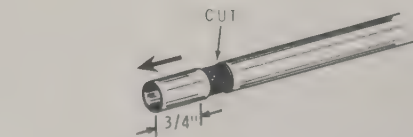
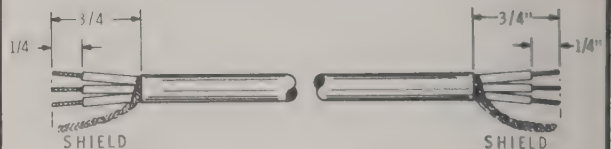
PICTORIAL 2-8

Refer to Pictorial 2-8 for the following steps.

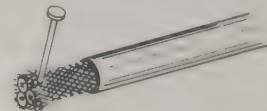
- () Twist the fine wire strands at the end of the fuseholder wire. Then insert the end of this wire into a #8 connector lug and solder it to the lug.

- () Remove 1/4" of insulation from the end of the large black stranded wire; then install a connector lug on the end of this wire.
- () Carefully peel away the backing paper from the blue and white identification label. Press the label onto the chassis just below the phono sockets. Refer to the numbers on this label in any communications you may have with the Heath Company about this kit.

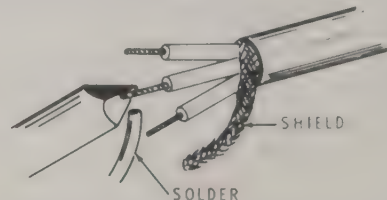
Lay the amplifier aside.



BEING CAREFUL NOT TO CUT THE SHIELD WIRES, REMOVE THE OUTER INSULATION.



USE A NAIL OR OTHER POINTED INSTRUMENT TO SEPARATE THE WOVEN SHIELD WIRES.



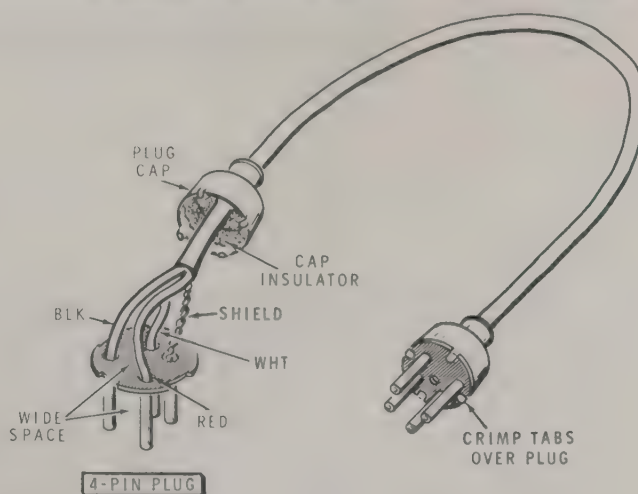
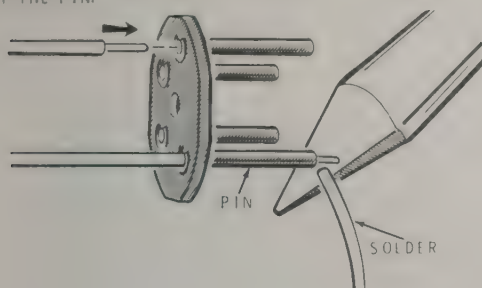
REMOVE 1/4" OF INSULATION FROM EACH WIRE, AND TWIST THE SHIELD WIRES. APPLY A SMALL AMOUNT OF SOLDER TO EACH WIRE END AND TO THE SHIELD LEAD.

Detail 2-9A

- () Refer to Detail 2-9A and prepare both ends of the 3-wire shielded cable as shown.

APPLY HEAT TO THE TIP OF THE PIN ONLY LONG ENOUGH FOR THE SOLDER TO BE DRAWN UP INTO THE PIN BY CAPILLARY ACTION.

CUT OFF EXCESS WIRE FROM THE TIP OF THE PIN.



PICTORIAL 2-9

Refer to Pictorial 2-9 for the following steps.

NOTE: In the following steps connect only one end of the 3-wire shielded cable.

- () Locate a plug cap with insulator. Make sure the insulator is seated in the cap.
- () Place the plug cap over one end of the 3-wire shielded cable so its large opening is toward the end of the cable.
- () Connect the wires and shield lead from the 3-wire shielded cable to a 4-pin plug as shown in Pictorial 2-9. Note the wide space between two of the pins.
- () Slide the plug cap down over the plug and crimp the tabs over the phenolic base. Be careful that you do not break the phenolic base of the plug.
- () In the same manner place a cap over the other end of the cable. Make sure the insulator is seated in the cap.

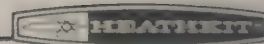
- () Solder the other end of the 3-wire shielded cable into the remaining 4-pin plug. Note the wide space between two of the pins.

- () Slide the plug cap down over the plug and crimp the tabs over the phenolic base.

This completes the assembly of your Amplifier. You will have a number of parts left over at this time. Some of these parts will be used when you install your system in the car. The 3-wire shielded cable will not be used unless you have both the Stereo Cassette Player and the FM Stereo Tuner. As you review the Installation Manual, note that a variety of installation options are provided. Depending upon the type of installation you choose, some parts will not be used. Save all leftover parts; you may wish to use them at some future time.

Refer to your Stereo Cassette Player or FM Stereo Tuner Manuals for instructions on mounting the Amplifier.





SPECIFICATIONS

Power Output	3.5 watts minimum per channel into 4 ohm load with less than 2% total harmonic distortion.
Power Bandwidth	30 Hz to 15,000 Hz.
Harmonic Distortion (at 500 mW)	Less than .5%, 30 Hz to 15,000 Hz.
Frequency Response	± 1 dB, 30 Hz to 15,000 Hz.
Signal to Noise Ratio	75 dB, 3.5 watts reference.
Input Sensitivity	100 mV typical.
Power Requirement	13.8 volts DC nominal at 1.5 amps.

The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

CIRCUIT DESCRIPTION

Refer to the Schematic Diagram (fold-out from Page 19) while you read this "Circuit Description."

The Amplifier consists of two identical channels. Therefore, only the right channel will be described.

Signals enter the circuit through either the phono plug or the phono socket and are coupled to the base of transistor Q1R. Transistors Q1R and Q2R form a differential amplifier which combines the input signal with the feedback signal from the output. This reduces distortion and controls the overall gain and response of the amplifier. This circuit also provides a high input impedance and the proper amount of isolation so the feedback signal does not distort the input signal.

The output signal of the differential amplifier is coupled from the collector of transistor Q1R to the base of transistor Q3R. The current of this transistor is held constant by a circuit that consists of diode D1R and resistors R21 and R31. This constant current amplifier greatly increases the linearity of the output signal from transistor Q5R.

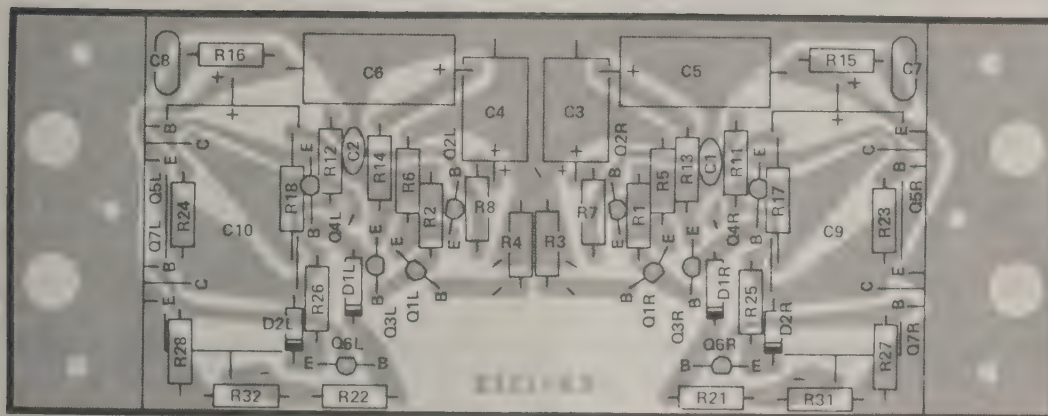
From transistor Q3R, the signal is coupled directly to the base of Q4R and through diode D1R to the base of Q6R.

The constant voltage drop across this diode provides the bias voltage for the driver and output transistors.

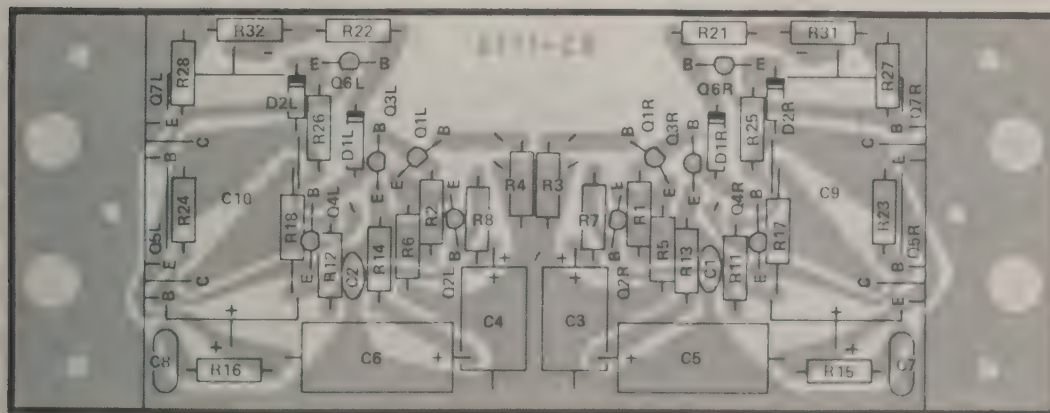
Resistor R25 and diode D2R, which are in the emitter circuit of transistor Q6R, are in series with the base to emitter junctions of transistors Q4R, Q5R, and Q6R. R25 drops enough voltage to keep these three transistors biased on. Diode D2R limits the amount of voltage that can develop across R25, therefore limiting the amount of current developed in the output stages.

Driver transistors Q4R and Q6R, and output transistors Q5R and Q7R, form a quasi-complementary output circuit. That is, a positive going signal applied to the base of transistor Q4R causes it to conduct. This in turn causes transistor Q5R to conduct, which causes the signal current through the speaker voice coil to increase. Negative going signals cause Q6R and Q7R to conduct which decreases the signal current through the speaker voice coil. This alternate increase and decrease of signal current through the voice coil of the speaker converts the electrical signal back into sound. Feedthrough capacitors C11, C12, C13, and capacitor C16 attenuate any ignition noise that may be on the power or speaker wires.

CIRCUIT BOARD X-RAY VIEWS

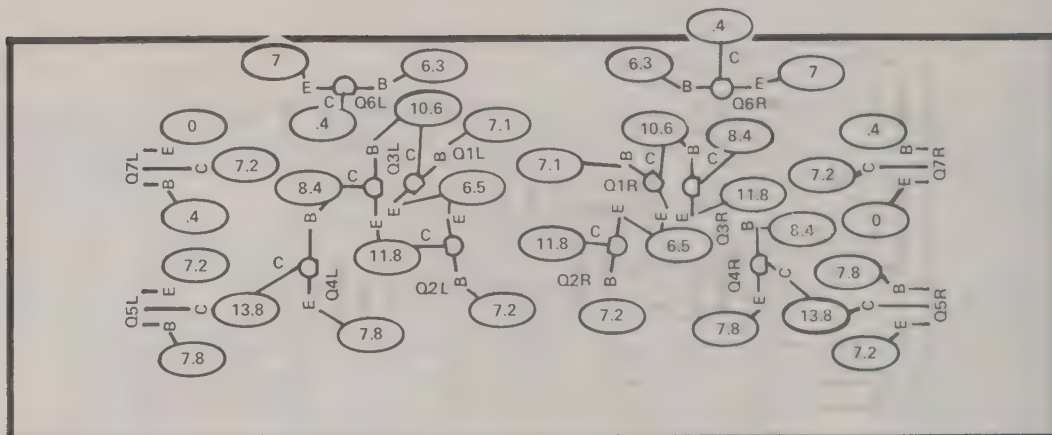


(Viewed from foil side)



(Viewed from component side)

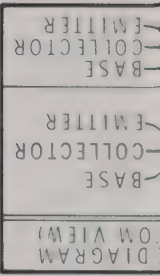
VOLTAGE CHART



(VIEWED FROM COMPONENT SIDE)

CHASSIS PHOTOGRAPH

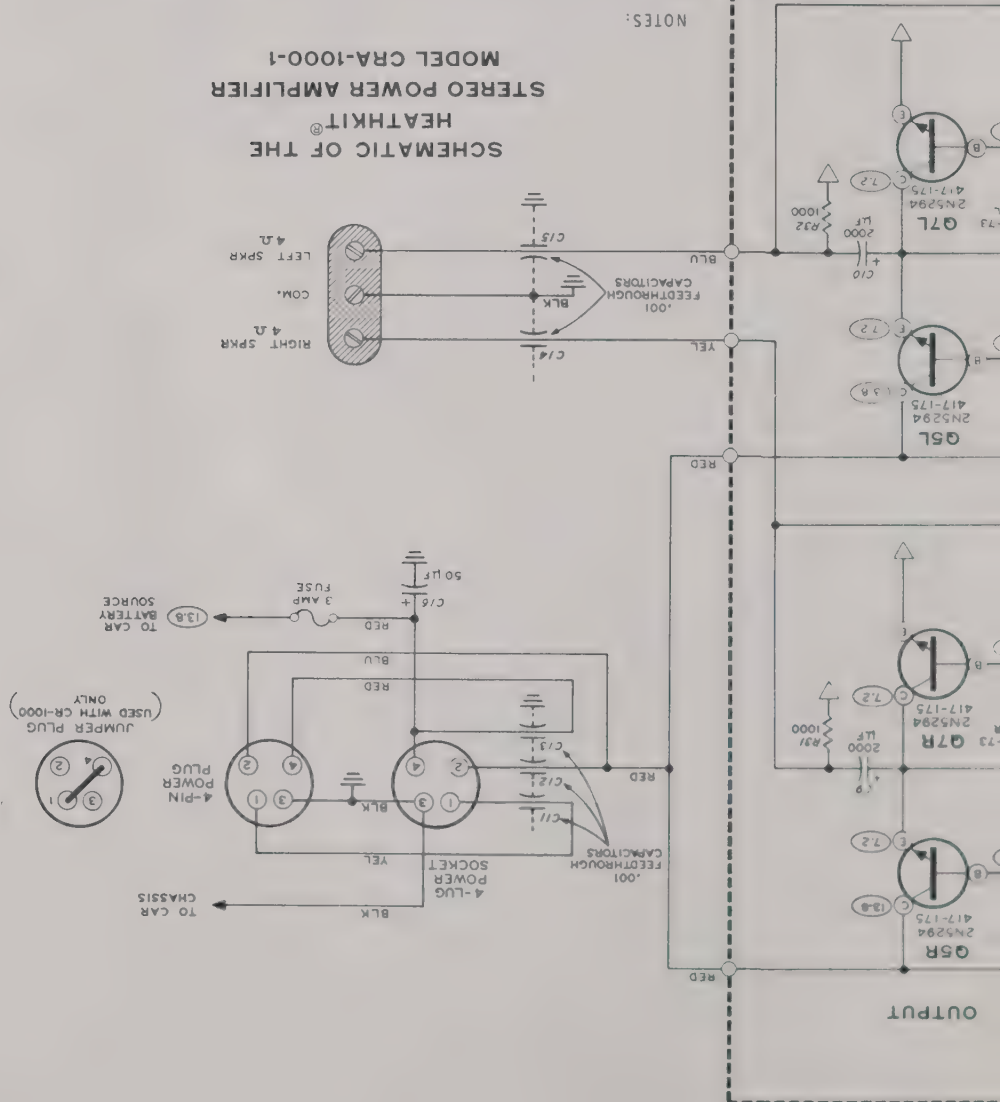




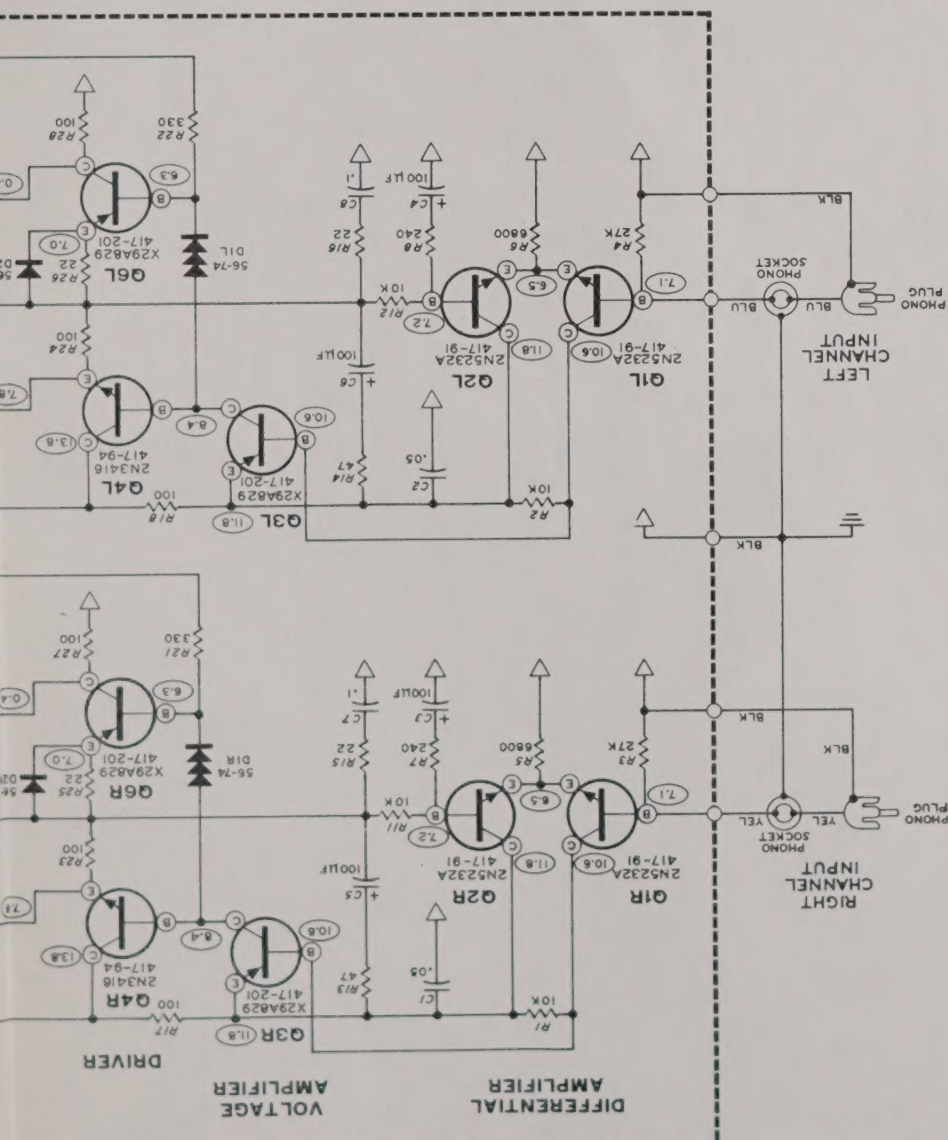
1. ALL RESISTORS ARE 1/2 WATT UNLESS MARKED OTHERWISE. RESISTOR VALUES ARE IN OHMS (K=1000).
2. CAPACITOR VALUES LESS THAN 1 ARE IN μ F. VALUES OF 1 AND ABOVE ARE IN pF UNLESS OTHERWISE MARKED.
3. THE AREA ENCLOSED BY A DOTTED LINE REPRESENTS THE CIRCUIT BOARD.
4. THIS SYMBOL INDICATES A POSITIVE DC VOLTAGE MEASUREMENT, TAKEN WITH A HIGH IMPEDANCE VOLT-METER, FROM THE POINT INDICATED TO CHASSIS GROUND. VOLTAGES MAY VARY $\pm 20\%$.
5. THIS SYMBOL INDICATES A CHASSIS GROUND.
6. THIS SYMBOL INDICATES A CIRCUIT BOARD GROUND.
7. REFER TO CHASSIS PHOTOGRAPHS AND CIRCUIT BOARD X-RAY VIEWS FOR THE PHYSICAL LOCATION OF PARTS.

SCHEMATIC OF THE HEATHKIT® STEREO POWER AMPLIFIER MODEL CRA-1000-1

NOTES:



COMPONENT	HEATH PART NO.	MANUFACTURERS TYPE NO.	BAS (BOT
Q1 Q2	417-91	2N5232A	G.E. X29A829
Q3 Q6	417-201	T.I. D29A4 2N3906	
Q4	417-94	2N3416	
Q5 Q7	417-175	2N5294	



TYPICAL COMPONENT TYPES

This chart is a guide to commonly used types of electronic components. The symbols and related illustrations

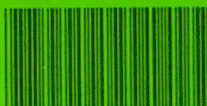
should prove helpful in identifying most parts and reading the schematic diagrams.

RESISTOR 	CAPACITOR 	TUBE
POTENTIOMETER (CONTROL) 	ELECTROLYTIC CAPACITOR 	TRANSISTOR
TRANSFORMER (IRON CORE) 	VARIABLE CAPACITOR 	RECTIFIER (DIODE)
TRANSFORMER (ADJUSTABLE POWDERED IRON CORE) ARROW INDICATES DIRECTION OF CORE MOVEMENT TO INCREASE INDUCTANCE 	BATTERY 	NEON BULB
TRANSFORMER (ADJUSTABLE CORE) 	PHONO JACK 	ILLUMINATING BULB
POWER TRANSFORMER 	PHONE JACK	METER
INDUCTOR (COIL) 	RECEPTACLE 	SPST SWITCH (TOGGLE) DPDT
PIEZOELECTRIC CRYSTAL 	SPEAKER 	SWITCH (ROTARY)
BINDING POST 	MICROPHONE 	FUSE
ANTENNA GENERAL LOOP	EARTH GROUND CHASSIS GROUND	CONDUCTORS NOT CONNECTED CONNECTED SHIELDED

HEATH COMPANY

BENTON HARBOR, MICHIGAN

MP MASTER



MA22869

THE WORLD'S FINEST ELECTRONIC EQUIPMENT IN KIT FORM

LITHO IN U.S.A.